

# Brief contents

Preface .....	v
Brief contents .....	vii
Contents .....	ix
List of figures .....	xiii
List of insets .....	xix
 Introduction .....	 1
 Part One: Decision problems and decision-making procedures .....	 5
1 Decision problems .....	7
2 Goal and problem-finding systems as requirements for the discovery of decision problems.....	17
3 Rational decisions .....	29
4 Decision-making procedures .....	41
 Part Two: A general heuristic decision-making procedure .....	 61
5 Overview of the decision-making procedure .....	63
6 Discovering and analysing the decision problem .....	81
7 Developing and evaluating options .....	99
8 Establishing the overall consequences of the options and making the final decision .....	123
9 A case study illustrating the application of the procedure.....	157
 Part Three: Special issues and approaches to resolving them.....	 181
10 Information procurement decisions .....	183
11 Collective decisions.....	197
 Final remarks.....	 219
 Index .....	 221
Bibliography.....	227

# Contents

Preface .....	v
Brief contents .....	vii
Contents .....	ix
List of figures .....	xiii
List of insets .....	xix
 Introduction .....	 1
 Part One: Decision problems and decision-making procedures .....	 5
1 Decision problems .....	7
1.1 The decision problem .....	7
1.2 Ways of solving decision problems .....	7
1.3 Types of decision problem .....	11
2 Goal and problem-finding systems as requirements for the discovery of decision problems .....	17
2.1 The functions of goal and problem-finding systems in the discovery of decision problems .....	17
2.2 Goal systems .....	18
2.2.1 Goal systems as combinations of single goals .....	18
2.2.2 Approaches to classifying goal systems .....	19
2.3 Problem-finding systems .....	22
3 Rational decisions .....	29
3.1 The sequence of events in decision-making procedures as a framework for rational decisions .....	29
3.2 The requirements of a rational decision process .....	35
3.3 Support for rational decision making from management science .....	39
4. Decision-making procedures .....	41
4.1 Important terms in decision-making .....	41
4.2 Decision-making procedure defined .....	44
4.3 The different types of decision-making procedures .....	45
4.3.1 The parameters of decision-making procedures and their values .....	45
4.3.2 Four types of decision-making procedures .....	46

4.3.3	A comparison of heuristic and analytic decision-making procedures .....	48
4.3.4	Examples of the different types of decision-making procedures .....	51
	Part Two: A general heuristic decision-making procedure .....	61
5	Overview of the decision-making procedure .....	63
5.1	The value of a general heuristic decision-making procedure .....	63
5.2	The proposed sequence of tasks .....	64
5.3	A brief explanation of the tasks .....	67
5.4	The basis of the general heuristic decision-making procedure .....	75
6	Discovering and analysing the decision problem .....	81
6.1	Discovering the decision problem .....	81
6.2	Analysing the decision problem .....	85
6.2.1	General considerations for problem analysis and naming .....	85
6.2.2	Establishing the decision situation .....	87
6.2.3	Determining the causes of the problem .....	91
6.2.4	Naming the decision problem or the sub-problems .....	94
6.2.5	Determining the problem structure .....	96
7	Developing and evaluating options .....	99
7.1	Developing options .....	99
7.1.1	General considerations for developing options .....	99
7.1.2	Techniques for the development of options .....	103
7.2	Defining the decision criteria .....	105
7.3	Examining how to determine the consequences and if necessary drawing up possible scenarios .....	109
7.4	The configuration of the decision problem as result of steps 3, 4 and 5 .....	116
7.5	Determining the consequences of the options .....	118
8	Establishing the overall consequences of the options and making the final decision .....	123
8.1	General considerations .....	123
8.2	Overview of the decision maxims and their applicability .....	127

8.3	Decision maxims for overcoming polyvalence.....	131
8.3.1	Utility value maxim .....	131
8.3.2	The maxim of the quasi-univalent decision .....	137
8.4	Decision maxims for overcoming risk .....	138
8.4.1	Expectation value maxim .....	138
8.4.2	Utility expectation value.....	139
8.4.3	Problems with the application of the decision maxims for overcoming risk .....	146
8.5	Decision maxims for overcoming uncertainty .....	146
8.6	Using decision maxims in combination to overcome polyvalence and risk or polyvalence and uncertainty.....	150
8.7	Evaluation of the decision maxims .....	154
9	A case study illustrating the application of the procedure.....	157
9.1	The situation .....	157
9.2	Discovering and analysing the problem.....	159
9.2.1	Discovering the problem .....	159
9.2.2	Analysing the problem .....	160
9.2.3	Summary of analysis and naming the problem.....	167
9.3	Developing and evaluating options.....	169
9.3.1	Developing options .....	169
9.3.2	Evaluating options .....	173
9.4	Making the decision .....	176
	Part Three: Special issues and approaches to resolving them.....	181
10	Information procurement decisions .....	183
10.1	Information procurement as a decision at the meta-level.....	183
10.2	Recommendations for decisions on information procurement .....	184
11	Collective decisions.....	197
11.1	Collective decisions and their growing importance in companies.....	197
11.2	Group goal systems and group decision behaviour .....	199
11.2.1	Group goal systems.....	199
11.2.2	Group decision behaviour .....	200
11.3	Rules for making collective decisions.....	205

11.3.1 Differing individual orders of preference as starting point .....	205
11.3.2 Requirements for forming a collective order of preference .....	206
11.3.3 Classic rules for the formation of a collective order of preference or for determining the option preferred by the collective .....	209
11.3.4 More complex procedures for the formation of the collective order of preference .....	211
Final remarks.....	219
Index .....	221
Bibliography .....	227

# List of figures

Figure 1.1:	The different types of decision research and their dependencies .....	9
Figure 1.2:	The parameters of decision problems and associated values .....	12
Figure 1.3:	Types of decision problem and connections between them .....	13
Figure 2.1:	Example of a goal system .....	21
Figure 2.2:	Parfitt and Collins' four indicators for a product group .....	24
Figure 2.3:	Bigler's strategic cause indicators for the monitoring of its university teaching materials .....	26
Figure 2.4:	The advantages and disadvantages of the different types of problem-finding systems and problem indicators .....	27
Figure 3.1:	Years of use and financial effects of the three options .....	32
Figure 3.2:	The net present value calculations for options B and C .....	33
Figure 3.3:	Descriptive model of the decision process .....	36
Figure 4.1:	Product range options for a producer of plant pots .....	42
Figure 4.2:	Central terms in decision methodology and relationships between them .....	44
Figure 4.3:	The parameters of decision-making procedures and associated values .....	47
Figure 4.4:	Four types of decision-making procedures .....	47
Figure 4.5:	Comparison of heuristic and analytic decision-making procedures .....	49
Figure 4.6:	The three requirements for using an analytic procedure .....	51
Figure 4.7:	Development of a corporate strategy .....	53
Figure 4.8:	General Electrics and McKinsey portfolio for the Baer Group .....	54
Figure 4.9:	Data for determining optimal sales and production programmes .....	55
Figure 4.10:	Graphic procedure for optimal sales and production programmes .....	56

Figure 4.11:	Harris and Wilson's saw-tooth model of stock movements .....	57
Figure 4.12:	Costs dependent on order quantity and minimum costs in the Harris-Wilson model.....	58
Figure 5.1:	Advantages and limitations of a general heuristic decision-making procedure .....	65
Figure 5.2:	The general heuristic decision-making procedure in the basic form .....	66
Figure 5.3:	The general heuristic decision-making procedure when solving parallel or consecutive sub-problems.....	68
Figure 5.4:	Backward-moving analysis .....	71
Figure 5.5:	Solution space, solution options and optimal solution .....	73
Figure 5.6:	The six decision types .....	74
Figure 5.7:	The basis of the general heuristic decision-making procedure .....	76
Figure 6.1:	Discovering the decision problem in the general heuristic decision-making procedure .....	82
Figure 6.2:	Problem discovery on the basis of a goal indicator.....	84
Figure 6.3:	Analysing the decision problem in the general heuristic decision-making procedure .....	86
Figure 6.4:	Sub-steps in Step 2.....	87
Figure 6.5:	Grid for recording the chronology of events .....	88
Figure 6.6:	Customer segment - sub-market - matrix for the toothpaste market .....	89
Figure 6.7:	The development of a threat problem .....	90
Figure 6.8:	The Du Pont scheme as an example of a deductive tree .....	93
Figure 6.9:	Deductive tree for the analysis of the problem of high staff turnover in a research department .....	94
Figure 6.10:	Basic forms of problem naming.....	97
Figure 6.11:	Situation of problem structuring.....	98
Figure 7.1:	Developing at least two options in the general heuristic decision-making procedure .....	100
Figure 7.2:	Effects of boundary conditions on the solution space .....	102

Figure 7.3:	Morphological analysis and the development of options.....	105
Figure 7.4:	Typical killer phrases.....	105
Figure 7.5:	Defining the decision criteria in the general heuristic decision-making procedure .....	106
Figure 7.6:	Temporal sequence showing the decision-making process, the decision, the implementation and the consequences.....	109
Figure 7.7:	Examining how to determine the consequences and if necessary drawing up possible scenarios in the general heuristic decision-making procedure .....	110
Figure 7.8:	Sub-steps in Step 5 .....	111
Figure 7.9:	Good, average and poor winter and summer .....	115
Figure 7.10:	Example of an empty decision matrix .....	117
Figure 7.11:	The six decision types .....	119
Figure 7.12:	Determining the consequences of the options in the general heuristic decision-making procedure.....	120
Figure 8.1:	Establishing the overall consequences of the options and making the final decision in the general heuristic decision-making procedure .....	124
Figure 8.2:	Example of a completed decision matrix.....	125
Figure 8.3:	Example of a completed decision matrix for a certain univalent decision.....	126
Figure 8.4:	The different decision maxims and their applications .....	128
Figure 8.5:	Example of a natural order in a polyvalent certain decision problem .....	130
Figure 8.6:	Example of a natural order in a polyvalent uncertain decision problem .....	131
Figure 8.7:	Example of the transformation of quantitative negative consequences into utility values .....	133
Figure 8.8:	Example of the transformation of qualitative positive consequences into utility values.....	134
Figure 8.9:	Example of the transformation of consequences with positive and negative values into utility values.....	135
Figure 8.10:	Example of the utility value maxim: starting point .....	136



Figure 8.11:	Example of the utility value maxim: calculation.....	136
Figure 8.12:	Example of expectation values .....	139
Figure 8.13:	Example of the utility expectation value maxim: starting point .....	140
Figure 8.14:	Example of the utility expectation value maxim: possible curve for the transformation of consequence values into utility values .....	141
Figure 8.15:	Example of the utility expectation value maxim: calculation of the utility expectation values .....	141
Figure 8.16:	The consequence values of the decision problem as starting point of the game.....	143
Figure 8.17:	Two different representations of the same decision problem .....	145
Figure 8.18:	Starting point for the illustration of use of the maxims for overcoming uncertainty .....	149
Figure 8.19:	Application of the minimax-risk maxim .....	150
Figure 8.20:	Decision matrix as starting point .....	151
Figure 8.21:	Decision matrix after overcoming uncertainty.....	152
Figure 8.22:	Decision matrix after overcoming polyvalence.....	153
Figure 8.23:	Example of a decision situation in which the minimax maxim should not be applied.....	154
Figure 8.24:	Evaluation of different decision maxims .....	155
Figure 9.1:	Organigram at Special Vehicles.....	158
Figure 9.2:	Cost carrier analysis .....	163
Figure 9.3:	Backward-moving analysis.....	168
Figure 9.4:	Contribution margin I for the four cost carriers of the chassis company for the year 2004 .....	170
Figure 9.5:	The five options.....	173
Figure 9.6:	The financial effects of the five options .....	175
Figure 9.7:	The effects of the five options on market position.....	177
Figure 9.8:	The completed consequence matrix .....	178
Figure 10.1:	Decision matrix for a product launch problem .....	186
Figure 10.2:	Decision tree with information gaps.....	188
Figure 10.3:	Calculation of the probabilities for studies advising in favour and against product launches.....	189

Figure 10.4:	Calculation of the probabilities of successful and unsuccessful product launches based on positive and negative studies .....	190
Figure 10.5:	Complete decision tree .....	191
Figure 10.6:	Procedure for making a decision about information procurement .....	193
Figure 11.1:	Parameters of collective decisions and associated values .....	198
Figure 11.2:	Goal system for an actor composed of several people .....	200
Figure 11.3:	Tendency towards poorer decisions by a group compared to an individual .....	201
Figure 11.4:	Configurations of two groups of three people ranking three options .....	208
Figure 11.5:	The configuration underlying Condorcet's voting paradox .....	211
Figure 11.6:	Individual orders of preference.....	212
Figure 11.7:	The preference patterns of the group.....	213
Figure 11.8:	The sums of the preference intensities of the 24 possible collective orders of preference .....	214
Figure 11.9:	Example of a four-level hierarchy.....	216
Figure 11.10:	The Saaty scale .....	217

## List of insets

Inset 1.1:	Descriptive decision theory, prescriptive decision theory and decision logic .....	8
Inset 2.1:	The operational cause indicators of Parfitt and Collins .....	23
Inset 2.2:	The strategic cause indicators of a publishing company .....	25
Inset 4.1:	Well-structured problems as a prerequisite for the use of analytic decision-making procedures .....	49
Inset 5.1:	Important heuristic principles and their application in the proposed general heuristic decision-making procedure .....	77
Inset 7.1:	Determining environmental scenarios as a basis for evaluating chair and ski lift projects .....	113
Inset 8.1:	Natural orders .....	129
Inset 8.2:	Transforming consequence values into utility values .....	132
Inset 8.3:	Determining utility values by means of a game .....	142
Inset 8.4:	Distorted recording of the attitude to risk through framing effects .....	144
Inset 8.5:	Determining the overall consequences in a polyvalent and uncertain decision problem .....	150
Inset 10.1:	Bayes's approach for establishing the value of additional information .....	184
Inset 11.1:	Asch's experiment on group members' pursuit of conformity .....	202
Inset 11.2:	The independence of irrelevant options as a requirement for forming a collective order of preference .....	207
Inset 11.3:	Condorcet's voting paradox .....	210
Inset 11.4:	Blin and Whinston's preference patterns .....	212
Inset 11.5:	Saaty's analytical hierarchical process .....	215